

Listing of Claims:

1. (Previously Presented) A servo circuit, comprising:
 - a servo channel operable to recover servo data from servo wedges that identify respective data sectors on a data-storage disk; and
 - a processor coupled to the servo channel and operable to detect a first spin-up wedge associated with a first one of the servo wedges and then to detect the first servo wedge by detecting a preamble of the first servo wedge using a trigonometric identity while the disk is attaining or after the disk attains an operating speed and before the servo channel detects any other servo wedge.
2. (Original) The servo circuit of claim 1 wherein the processor is operable to cause the servo channel to recover servo data from the first servo wedge after the processor detects the first servo wedge and before the servo channel recovers servo data from any other servo wedge.
3. (Original) The servo circuit of claim 1 wherein:
 - the first spin-up wedge comprises a zero-frequency field; and
 - the processor is operable to detect the first spin-up wedge by detecting the zero-frequency field.
4. (Canceled)
5. (Previously Presented) The servo circuit of claim 1 wherein:
 - the first spin-up wedge comprises a zero-frequency field;
 - the preamble follows and is contiguous with the zero-frequency field; and
 - the processor is operable to detect the first spin-up wedge by detecting the zero-frequency field and is operable to detect the first servo wedge by detecting the preamble after detecting the zero-frequency field.

6. (Previously Presented) The servo circuit of claim 1 wherein:

the first servo wedge comprises a servo synchronization mark following the preamble;

the processor is operable to detect the first servo wedge by detecting the preamble; and

the servo channel is operable to recover the synchronization mark in response to the processor detecting the preamble.

7. (Previously Presented) The servo circuit of claim 1, wherein:

the first servo wedge and a second servo wedge following the first servo wedge each comprise a preamble and a servo synchronization mark following the preamble;

the servo channel is operable to recover the synchronization mark of the first servo wedge in response to the processor detecting the preamble of the first servo wedge;

after detecting the first servo wedge, the processor is operable to detect the second servo wedge by detecting the preamble of the second servo wedge; and

the servo channel is operable to recover the synchronization mark of the second servo wedge in response to the processor detecting the preamble of the second servo wedge.

8. (Previously Presented) A servo circuit, comprising:

a servo channel operable to recover servo data from servo wedges that identify respective data sectors on a data-storage disk; and

a processor coupled to the servo channel and operable to detect a first spin-up wedge associated with a first one of the servo wedges and then to detect the first servo wedge while the disk is attaining or after the disk attains an operating speed and before the servo channel recovers servo data from any other servo wedge;

wherein the first spin-up wedge and a second spin-up wedge following the first spin-up wedge each comprise a zero-frequency field,
the first servo wedge and a second servo wedge following the one servo wedge each comprise a preamble and a servo synchronization mark following the preamble,
the processor is operable to detect the first spin-up wedge by detecting the zero-frequency field of the first spin-up wedge,
the processor is operable to detect the first servo wedge by detecting the preamble of the first servo wedge after detecting the first spin-up wedge,
the servo channel is operable to recover the synchronization mark of the first servo wedge in response to the processor detecting the preamble of the first servo wedge,
after recovering the synchronization mark of the first servo wedge, the processor is operable to detect the second spin-up wedge by detecting the zero-frequency field of the second spin-up wedge,
the processor is operable to detect the second servo wedge by detecting the preamble of the second servo wedge after detecting the second spin-up wedge, and
the servo channel is operable to recover the synchronization mark of the second servo wedge in response to the processor detecting the preamble of the second servo wedge.

9. (Original) The servo circuit of claim 1, wherein:

the first spin-up wedge comprises a zero-frequency field;
the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and
the processor is operable to,
compare samples of the read signal to a threshold, and

detect the first spin-up wedge if a predetermined number of consecutive samples each have a predetermined relationship to the threshold.

10. (Original) The servo circuit of claim 1, wherein:

the first spin-up wedge comprises a zero-frequency field;

the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and

the processor is operable to,

compare samples of the read signal to a threshold, and

search for the first spin-up wedge until a predetermined number of consecutive samples each have a predetermined relationship to the threshold.

11. (Original) The servo circuit of claim 1 wherein the first spin-up wedge is disposed within the first servo wedge.

12. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;

the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and

the processor is operable to,

compare samples of the read signal to a threshold, and

detect the first spin-up wedge if the processor detects the preamble of the first servo wedge within a predetermined range of consecutive samples that have a predetermined relationship to the threshold.

13. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;

the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and
the processor is operable to,
compare samples of the read signal to a threshold, and
detect the first spin-up wedge if the processor detects the preamble of the first servo wedge within a predetermined range of consecutive samples that are less than the threshold.

14. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;
the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and
the processor is operable to,
compare samples of the read signal to a threshold, and
detect the first spin-up wedge if the processor detects the preamble of the first servo wedge within a predetermined window of consecutive samples that are less than or equal to the threshold.

15. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;
the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and
the processor is operable to,
compare samples of the read signal to a threshold,
search for the preamble of the first servo wedge in response to a first predetermined number of consecutive samples that each have a predetermined relationship to the threshold, and

detect the first spin-up wedge if the processor detects the preamble within a second predetermined number of consecutive samples that follow the first predetermined number of consecutive samples.

16. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;

the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and

the processor is operable to,

compare samples of the read signal to a threshold,

search for the preamble of the first servo wedge in response to a first predetermined number of consecutive samples that have a predetermined relationship to the threshold, and

detect the first spin-up wedge if the processor detects the preamble within a second predetermined number of consecutive samples that immediately follow the first predetermined number of consecutive samples.

17. (Previously Presented) The servo circuit of claim 1 wherein:

the first spin-up wedge comprises a zero-frequency field;

the servo channel is operable to generate a zero-frequency or approximately zero-frequency read signal that represents the zero-frequency field and to sample the read signal; and

the processor is operable to,

compare samples of the read signal to a threshold,

search for the preamble of the first servo wedge in response to a first predetermined number of consecutive samples that have a predetermined relationship to the threshold, and

abort the search for the preamble of the first servo wedge if the processor does not detect the preamble within a second predetermined number of consecutive samples that immediately follow the first predetermined number of consecutive samples.

18. (Previously Presented) A servo circuit, comprising:

a servo channel operable to recover servo data from servo wedges that identify respective data sectors on a data-storage disk; and

a processor coupled to the servo channel and operable to detect a first spin-up wedge associated with a first one of the servo wedges and then to detect the first servo wedge while the disk is attaining or after the disk attains an operating speed and before the servo channel recovers servo data from any other servo wedge;

wherein the first servo wedge comprises a preamble,

the servo channel is operable to generate a read signal that represents the preamble and to sample the read signal,

the processor is operable to detect the first servo wedge by detecting the preamble from the samples,

the servo channel comprises an interpolator loop that acquires the timing of the samples with respect to the read signal while the processor is detecting the preamble and that begins tracking the timing of the samples a predetermined time after the processor detects the preamble, and

the processor is operable to stop the interpolator loop from tracking the timing of the samples if the processor fails to detect the preamble for at least a predetermined number of samples after the interpolator loop begins tracking the timing of the samples.

19. (Original) The servo circuit of claim 1 wherein the one servo wedge comprises a binary sequence having groups of no more and no fewer than a predetermined number

of consecutive bits each having a first logic level, the groups separated from each other by respective bits having a second logic level.

20. (Previously Presented) A servo circuit, comprising:

a servo channel operable to recover servo data from servo wedges that identify respective data sectors on a data-storage disk; and

a processor coupled to the servo channel and operable to detect first and second portions of one of the servo wedges while the disk is attaining or after the disk attains an operating speed and before the servo channel recovers servo data from any other servo wedge, the processor operable to detect the second portion using a trigonometric identity.

21. (Original) The servo circuit of claim 20 wherein:

the first portion of the one servo wedge comprises a spin-up wedge; and
the second portion of the servo wedge comprises a preamble.

22. (Original) The servo circuit of claim 20 wherein the processor is operable to detect the first portion of the one servo wedge before detecting the second portion.

23. (Previously Presented) A disk-drive system, comprising:

a data-storage disk having a surface, data sectors at respective locations of the surface, servo wedges that each include respective servo data that identifies the location of a respective data sector, and spin-up wedges that each include spin-up data and that are respectively associated with some or all of the servo wedges;

a motor coupled to and operable to rotate the disk;

a read head operable to generate a read signal that represents the servo data and the spin-up data, the read head having a position with respect to the surface of the data-storage disk;

a read-head positioning circuit operable to move the read head over the surface of the disk; and
a servo circuit coupled to the read head and to the read-head positioning system, the servo circuit including,
a servo channel operable to recover the servo data from the servo wedges and the spin-up data from the spin-up wedges; and
a processor coupled to the servo channel and operable to detect a spin-up wedge associated with one of the servo wedges and then to detect the servo wedge by detecting a preamble of the servo wedge using a trigonometric identity while the disk is attaining or after the disk attains an operating speed and before the servo channel detects any other servo wedge.

24. (Original) The disk-drive system of claim 23 wherein:

the servo channel is operable to recover the servo data from the detected servo wedge; and
the servo circuit is operable to,
determine an initial position of the read head from the recovered servo data, and
provide the initial position to the read-head positioning circuit.

25. (Original) The disk-drive system of claim 23 wherein the servo channel is operable to recover the servo data from the detected servo wedge and to provide the location of the respective data sector to the read-head positioning circuit.

26. (Original) The disk-drive system of claim 23 wherein:

the servo channel is operable to recover the servo data from the detected servo wedge and to provide the location of the respective data sector to the read-head positioning circuit; and

the read-head positioning circuit is operable to determine an initial position of the read head from the location of the respective data sector.

27. (Original) The disk-drive system of claim 23 wherein the read-head position circuit and the servo circuit are unable to determine the position of the read head before the processor detects the one servo wedge.

28. (Original) The disk-drive system of claim 23 wherein the read head comprises a read-write head.

29. (Previously Presented) A disk-drive system, comprising:

- a data-storage disk having a surface, a data sector at a location of the surface, and a servo wedge including servo data that identifies the location of the data sector;

- a motor coupled to and operable to rotate the disk;

- a read head operable to generate a read signal that represents the servo data and having a position with respect to the surface of the data-storage disk;
- a read-head positioning system operable to move the read head over the surface of the disk; and

- a servo circuit coupled to the read head and to the read-head positioning system, the servo circuit including,

- a servo channel operable to recover the servo data from the servo wedges; and

- a processor coupled to the servo channel and operable to detect first and second portions of one of the servo wedges while the disk is attaining or after the disk attains an operating speed and before the servo channel recovers servo data from any other servo wedge, the processor operable to detect the second portion using a trigonometric identity.

30. (Previously Presented) A method, comprising:

- rotating a data-storage disk having a surface from a first rotational speed to a second rotational speed over a first time period, the circumferential position of a read head relative to a location of the disk surface being unknown for at least a portion of the first time period;
- during or after the first time period and while the circumferential position of the read head is unknown,
- detecting a spin-up wedge, and
- after detecting the spin-up wedge, detecting a servo wedge by detecting a preamble of the servo wedge using a trigonometric identity, the servo wedge identifying a sector of the data-storage disk; and
- recovering sector location identifying data from the detected servo wedge and determining the circumferential position of the read head from the recovered sector location identifying data before detecting any other servo wedge.

31. (Original) The method of claim 30 wherein the second rotational speed is higher than the first rotational speed.

32. (Previously Presented) The method of claim 30 wherein detecting the spin-up wedge comprises:

- sampling data from the disk surface;
- counting the number of consecutive samples that have a predetermined relationship to a threshold; and
- detecting the spin-up wedge if the number of consecutive samples equals a predetermined number.

33. (Previously Presented) The method of claim 30 wherein:

- detecting the spin-up wedge comprises,
- sampling data from the disk surface, and

counting the number of consecutive samples that have a predetermined relationship to a threshold; and
detecting the servo wedge comprises,
searching for the servo wedge if the number of consecutive samples equals a predetermined number; and
detecting the servo wedge if a portion of the servo data is within a predetermined sampling window following the predetermined number of consecutive samples.

34. (Previously Presented) The method of claim 30 wherein:

detecting the spin-up wedge comprises,
sampling data from the disk surface, and
counting the number of consecutive samples that have a predetermined relationship to a threshold; and
detecting the servo wedge comprises,
searching for the servo wedge if the number of consecutive samples equals a predetermined number; and
detecting the servo wedge if a portion of the preamble is within a predetermined sampling window following the predetermined number of consecutive samples.

35. (Canceled)